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J. Webster

THE SHEPHERD of BANBURY'S RULES

To judge of the

CHANGES OF THE WEATHER,

Grounded on Forty Years Experience.

To which is added,

A rational ACCOUNT of the Cauſes of ſuch Alterations, the Nature of Wind, Rain, Snow, &c. on the Principles of the *Newtonian* Philoſophy.

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LONDON:
Printed for W. BICKERTON, in the *Temple Exchange*, *Fleet-ſtreet*. MDCCXLIV.

(Price 1 s.)

INTRODUCTION.

AS we very juſtly eſteem it a fit Tribute of Admiration to adorn natural Curioſities, by ſetting them as richly and as advantageouſly as art can direct, ſo the following Obſervations of the Shepherd of *Banbury* have appeared to me worthy of being preſented to the Eye of the Public, with all the Luſtre that it was in my Power to give them. It is one Thing to obſerve, and another to reaſon upon Obſervations, and it very rarely happens that both can be taken into the Compaſs of one Man's Life. We ought therefore to conſider it as a very lucky Incident, when the Obſervations of another Man upon whom we can depend fall into our Hands, and enable us to add natural Experience to the Notions deriv'd to us from Books of Philoſophy.

There is a degree of Pedantry in Deſarts as well as Colleges. Men who derive their knowledge entirely from Experience, are apt to deſpiſe what they call Book Learning, and Men of great Reading are as apt to fall into a leſs excuſable miſtake, that of taking the Knowledge of Words, for the Knowledge of Things, whereas there are not any two points more oppoſite in Nature, ſince we very rarely ſee that either true Scholars are talkative, or that talkative Men are true Scholars.

The Shepherd whoſe ſole Buſineſs it is to obſerve what has a Reference to the Flock under his Care, who ſpends all his Days and many of his Nights in the open air, and under the wide ſpread Canopy of Heaven, is in a Manner obliged to take particular Notice of the Alterations of the Weather, and when once he comes to take a Pleaſure in making ſuch Obſervations, it is amazing how great a Progreſs he makes in them, and to how great a Certainty at laſt he arrives by mere dint of comparing Signs and Events, and correcting one Remark by another. Every thing in Time becomes to him a Sort of Weather-Gage. The Sun, the Moon, the Stars, the Clouds, the Winds, the Miſts, the Trees, the Flowers, the Herbs, and almoſt every animal with which he is acquainted. All theſe I ſay become to ſuch a Perſon Inſtruments of real Knowledge.

There are a Sort of half wiſe People who from the Conſideration of the Diſtances of Things, are apt to treat ſuch Prognoſtications as they phraſe them with much Contempt. They can ſee no Connection between a Cat's waſhing her Face, and the Sky's being overſpread with Clouds, and therefore they boldly pronounce that the one has no Relation to the other. Yet the ſame People will readily own that the fluttering of the Flame of a Candle is a certain token of Wind, which however is not diſcernible by their feeling; becauſe it lies within the Compaſs of their Underſtanding, to diſcern that this Fluctuation of the Flame is cauſed by the Wind acting upon it, and therefore they are inclined to believe this, though it does not fall actually under the Cognizance of their Senſes. But a Man of a larger compaſs of Knowledge who is acquainted with the Nature and Qualities of the Air, and knows what an Effect any Alterations in the Weight, the Dryneſs, or the Humidity of it has upon all animal Bodies, eaſily perceives the Reaſon why other Animals are much ſooner ſenſible of any Alterations that happen in that Element than Men, and therefore to him the cawing of Ravens, the chattering of Swallows, and a Cats waſhing her Face are not ſuperſtitious Signs, but natural tokens (like that of the Candles fluttering) of a Change of Weather, and as ſuch they have been thought worthy of Notice by *Ariſtotle*, *Virgil*, *Pliny*, and all the wiſeſt and graveſt Writers of Antiquity.

But ſtill a few ſlight and trivial Obſervations of this Kind, and ſuch as are in the Power of every Man to make, go but a very little Way in furniſhing us with a uſeful Knowledge of the Indications of the Weather. To ſupply theſe, and to have conſtantly at Hand the Means of judging of theſe Alterations Men of great Genius have invented, and wonderful Inventions they are! Inſtruments for meaſuring the Heat, the Cold, the Weight, the Dryneſs, and the Humidity of the Air, with great Exactneſs, and upon theſe they Reaſon as to the changes of Weather with great Accuracy and Certainty. It would undoubtedly be a great Folly to pretend to queſtion either the Truth of their Obſervations, or the Uſefulneſs of them: But then we may have leave to conſider how far, and to how great a Degree they are uſeful. The Thermometer meaſures exactly the Degrees of Heat, but the Air muſt be hot to ſuch, or ſuch a Degree before it is diſcerned by this Inſtrument. The Barometer indicates the Weight of the Air, and the riſing and falling of the Quickſilver expreſſes the Alterations in its Weight with wonderful Nicety, but then thoſe Alterations are the Cauſe of this. In like manner the Hygrometer, or Hygroſcope meaſures the Dryneſs or the Humidity of the Air very plainly and very exactly, but the Weather muſt alter, muſt become dryer or moiſter than it was, before theſe Alterations are viſible; and therefore however ingenious, however curious, however uſeful theſe Inſtruments may be in other Reſpects, they undoubtedly contribute very little to the prognoſticating a Change of Weather at a Diſtance, and it is from the Experience of this, that they are ſo little eſteemed, ſo lightly regarded by the common People.

Our Shepherd's Obſervations are of quite another Nature, moſt of them give us a Day's Notice, many a Weeks, and ſome extend to ſeveral Months Prognoſtication of the Changes of the Weather, and of how great Uſe theſe may be to all Ranks and Degrees of People, to the ſedentary Valetudinarian, as well as the active Traveller, to the Sportſman who purſues his Game, as well as to the induſtrious Huſbandman who conſtantly follows his Labour, in ſhort to every Men in every Situation in ſome Degree or other, is ſo very clear and intelligible that it would be a mere waſte of Words, and a very idle diſplay of Rhetoric to attempt the making it clearer. Every Man living would be glad to foreſee the Alterations of Weather if he could, and conſequently to moſt People, if not to all, theſe Obſervations grounded on no leſs than forty Years Experience cannot but be acceptable.

To make the beſt uſe of ones Talent, and to employ the Lights derived from the Station in which Providence has placed one for the Benefit of Mankind, is undoubtedly diſcharging ones Duty, anſwering the End of our Creation, and correſponding with the Oeconomy of Nature, which does nothing in vain. This Propoſition is equally true, let a Man's Station be what it will. It is the Manner in which we perform, and not the Character that makes the Player, and in this Senſe what Man is not a Player? Here then is an Inſtance of one who has for many Years ſtudied his Part, and now communicates his Diſcoveries freely. In a Phyſician, in a Philoſopher, in a Mathematician, this would be highly commendable, and why not in a Shepherd? We do not caſt our own Parts in the Drama of Life; no, this is performed by the great Author of Nature. He who adjuſted every Thing on Earth with ſuch Beauty and Harmony, he who taught the Heavenly Bodies to move; the ſame, diſtributed their ſeveral Offices to Men. May we not therefore ſuppoſe that every Man's Part is well caſt, and that our Abilities are exactly proportioned to our Stations? If ſo, he who does all he can, does all that ought to be expected from him, and merits from impartial Judges the moſt general and juſt Applauſe. To be convinced of this we need only reflect on the narrow and ſelfiſh Conduct of ſome, who either by Study or by Chance have acquired certain valuable Secrets, which with the utmoſt Induſtry they conceal in order to be the more admired, or that they may render them beneficial to themſelves. How contrary the Conduct of our Shepherd! His Pains were all his own, but the Fruit of them he thus generouſly offers to the Public. Good Senſe and the dictates of Nature taught him this Maxim, *That what might benefit* many, *ſhould not be concealed by* one *from Views of* Profit *or of* Pride.

In my Remarks upon the Shepherds Rules, I have ſometimes endeavour'd to ſupport them by Authorities, which I muſt confeſs would have been of little Uſe if the Author had been a Perſon of Learning; but when it is conſidered that theſe Obſervations were purely the Effect of his own Attention and Experience, it certainly ſtrengthens them, and adds greatly to their Credit that they have been eſteemed evident Signs of the ſame Effects, by the greateſt Maſters in this Kind of Science. The Art of prognoſticating the Weather may be conſidered as a Kind of decyphering, and in that Art it is always allow'd a point of great Conſequence, when ſeveral Maſters therein agree as to the meaning of a Character, and it is from thence very juſtly preſum'd that this Character is rightly decypher'd. I have alſo endeavour'd to explain moſt of his Obſervations, according to the Rules of the new Philoſophy which as it is grounded upon Experiments, ſo it generally ſpeaking enables us to give a fair and rational Account of almoſt all the Phænomena taken Notice of by the Shepherd of *Banbury*. I likewiſe have added ſome other Rules in Relation to the Weather taken from the common ſayings of our Country People, and from old *Engliſh* Books of Huſbandry, but I have diſtinguiſhed all theſe from the Obſervations themſelves, ſo that the Reader will have no Trouble to diſcern the Text from the Commentary, or to know what belongs to the Shepherd of *Banbury*, and what to the Editor of his Obſervations. This I think may ſerve by Way of Introduction, let us now proceed to the Rules themſelves.

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THE
Country Calendar,
OR THE
SHEPHERD of BANBURY'S
OBSERVATIONS.

I.

SUN. *If the Sun riſe red and fiery*—Wind and Rain.

THE Reaſon of this Appearance is becauſe the Sun ſhines thro' a large Maſs of Vapours, which occaſions that red Colour that has been always eſteemed a Sign of Rain, eſpecially if the Face of the Sun appear bigger than it ought, for then in a few Hours the Clouds will grow black, and be condens'd into Rain, ſudden and ſharp if in the Summer, but ſettled and moderate if in Winter.

The old *Engliſh* Rule publiſhed in our firſt Almanacks agrees exactly with our Author's Obſervation.

If red the Sun begins his Race,
Be ſure that Rain will fall apace.

If the Reader would ſee this elegantly deſcrib'd, the Maſter of Poets hath it thus. *(a)*

Above the Reſt, the Sun who never lies,
Foretells the Change of Weather in the Skies,
For if he riſe unwilling to his Race,
Clouds on his Brow, and Spots upon his Face.
Or if thro' Miſts he ſhoots his ſullen Beams,
Frugal of Light, in looſe and ſtraggling Streams,
Suſpect a drizzling Day and ſouthern Rain,
Fatal to Fruits, and Flocks, and promis'd Grain.

(a) *Sol* quoque & exoriens, & cum ſe condit in undas,
Signa dabit: *Solem* certiſſima ſigna ſequntur,
Et quæ Mane refert, & quæ ſurgentibus *Aſtris*,
Ille ubi naſcentem *maculis* vari averit Ortum
Concavus in Nubem, medioque refugerit Orbe;
Suſpecti tibi ſint *Imbres*. Namque urget ab alto
Arboribuſque ſatiſque Notus Pecorique ſiniſter.

Virgil. Georgic. Lib. I. v. 438.

II.

If cloudy and it ſoon decreaſe, } Certain fair Weather.

I Conceive the Reaſon of this to be, that the Vapours being then ſpecifically lighter than the Air, are ſtill riſing upwards, in which they are aſſiſted by the Heat of the Sun Beams, agreeable to the Notion of Dr. *Derham*, who obſerves that after much cloudy Weather it is always fair before it Rains, becauſe the watry Vapours are not condenſed, till they reach the cold upper Region agreeable to the common *Engliſh* ſaying,

The Evening red and Morning Gre
Is a Sign of a fair Day.

It is alſo an Obſervation of *Pliny*'s in his natural Hiſtory. *(b)*

Si ab ortu ſolis repellentur Nubes, & ad occaſum abibunt, *Serenitatem* denunciabunt.

That is,

If at Sun riſing the Clouds are driven away and retire as it were to the *Weſt*, this denotes fair Weather.

(b) Nat. Hiſt. Lib. XVIII. Cap. 35.

There is an old Adage to this Purpoſe, which becauſe it is very prettily expreſſed, deſerves our Notice, *viz.*

A red Evening and a grey Morning ſets the Pilgrim a Walking.

In *French* thus.

Le Rouge ſoir, & blanc Matin ;
Font rejouvir le pelerin.

The *Italians* ſay the ſame.

Sera Roſa, & nigro Matino ;
Allegra il Peregrino.

III.

CLOUDS *Small and round, like a Dappley-grey with a* North-Wind. } Fair Weather for 2 or 3 Days.

THIS is differently expreſſed by other Authors. My Lord *Bacon* tells us, that if Clouds appear white, and drive to the *N. W.* it is a ſign of ſeveral Days fair Weather.

Our old *Engliſh* Almanacks have a Maxim to this Purpoſe.

If woolly Fleeces ſpread the Heavenly Way,
Be ſure no Rain diſturbs the Summer Day.

And *Pliny* to the ſame Purpoſe. *(c)*

Si Sol oriens cingetur Orbe, & poſtea totus defluxerit æqualiter, *Serenitatem* dabit.

That is,

If the riſing Sun be incompaſſed with an Iris or Circle of white Clouds and they equally fly away, this is a Sign of fair Weather.

There is another *Engliſh* Proverb worth remembring.

In the Decay of the Moon,
A cloudy Morning bodes a fair Afternoon.

IV.

Large like Rocks. —— Great Showers.

IN the old Almanacks, we have this Sign of the Weather thus expreſſed.

When Clouds appear like Rocks and Towers,
The Earths refreſh'd by frequent Showers.

The Reaſon of this ſeems to be that the watry Vapours are then condenſed, or condenſing, which gives them this rough and ragged Appearance,

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(c) Ubi ſupra.

and as ſoon as the thin Films that retain the Water are broke by this Preſſure, theſe heavy Clouds deſcend in Rain.

Theſe Obſervations as well as ſome that follow are agreeable to all Climates, which is the Reaſon that they appear in ſo many different Authors, and have been taken notice of in ſo many Ages. This however does not at all diminiſh the Credit, or the Merit of our Shepherd's Obſervations, who certainly drew them not from Books but from his own Experience, and therefore their agreeing ſo well with the Rules of other great Maſters, ought to eſtabliſh his Authority in ſuch Caſes, as are not ſupported by a like Concurrence from ancient or modern Writers, the Teſtimony of Nature is always ſufficient Evidence.

V.

If ſmall Clouds increaſe, —— Much Rain.

THIS and the following Obſervation cannot well be underſtood, without giving ſome Account of Clouds in general. The Atmoſphere is ſuppoſed to extend itſelf about five Miles round this Globe of Earth, and within that Space move all kind of Vapours exhal'd by the Sun's Force or protruded by the ſubterraneous Heat. The aſcending of theſe Vapours into the Air, depends upon many Things and is thererefore as different as it's Cauſes, for Inſtance, their Aſcent depends in the firſt place on the Degree of Heat with which they are drawn up or forc'd out; next upon the Lightneſs of the Vapours themſelves; thirdly, on the Denſity or Rarity of the Air thro' which they paſs; and laſtly, on the Force and Direction of the Winds, which they encounter in their Paſſage.

According to the Nature of theſe Vapours and the Circumſtance attending their Paſſage, they appear to us differently below. For if they be extreamly ſubtile they mount very high, and there according to the Sentiment of Sir *Iſaac Newton*, form by Refraction the Azure, or blue Colour, that overſpreads the Sky in ſerene Weather. Clouds, while they remain viſible, do not riſe above the Height of a Mile; and we always obſerve, that the higheſt are of a very light Colour, and hardly ſeen. If, therefore, ſmall Clouds increaſe, it ſhews, that the Diſpoſition of the Air is ſuch, as that theſe Clouds cannot riſe therein, either from their own Weight, the want of a protruſive Force, or from the falling of the Wind, which in cloudy Weather is always a Sign of Rain.

VI.

If large Clouds decreaſe,——Fair Weather.

THE ſame kind of Reaſoning accounts very clearly for this Prognoſtick, ſince it ſhews, that the Vapours are either exhal'd by the Sun's Heat, or are driven off by Winds, and ſo reſolv'd into ſmaller Clouds, capable of aſcending higher in the Atmoſphere; all which are Circumſtances that ſecure us from Rain, and afford us a Certainty of fair Weather.

It is, however, to be obſerved, that large black Clouds are frequently, in a Summer Evening, melted into Dews; and this much more frequently happens in the Autumn, becauſe the Evenings are then cooler, and the Vapours more eaſily condenſed for that Reaſon. In all Obſervations of this Sort, there is a great Degree of Prudence and good Senſe required to apply them, and hence it very frequently happens that ſuch Obſervations are condemn'd, as treacherous and abuſive merely becauſe thoſe who would employ them, want the Sagacity which is requiſite to underſtand them clearly.

VII.

MISTS. *If they riſe in low Ground and ſoon vaniſh.* } Fair Weather.

THIS is a ſure Sign and very well expreſſed, that is clearly and in few Words which is the Excellency of ſuch Aphoriſms. In order to be convinced of its good Senſe and Certainty, we muſt conſider a little what *Miſts* are, whence they riſe, and what becomes of them.

Miſts are ſtrictly ſpeaking uncompacted Exhalations, which while they fleet near the Earth are ſtiled *Miſts*, but when they aſcend into the Air, are called *Clouds*. If therefore riſing out of low Ground, they are driven along the Plain, and are ſoon loſt to the Sight, it muſt ariſe from ſome of theſe Cauſes. That there is an Air abroad ſufficient to divide and reſolve them, or the Heat of the Sun has been ſtrong enough to exhale them, that is to rarify them, ſo as to render them lighter than the Air thro' which they were to paſs. Which ever Way this happens the Maxim remains unimpeach'd.

VIII.

If they riſe to the Hill tops.—Rain in a Day or two.

WHEN Miſts are very heavy in themſelves, and riſe only by the Action of that protruſive Force, exerted by the ſubterranean Fire, they can riſe no higher than where the Gravitation becomes ſuperior to that protruſive Force, for then they deſcend again by their own Weight, and this Occaſions the Appearance mentioned in the Obſervation of their hanging upon Hill tops where they are very ſoon condenſed, and fall down in Rain.

There was formerly a very idle and ill grounded Diſtinction between moiſt and dry Exhalations, whereas in Truth all Exhalations are moiſt, or in other Words are watry Steams thrown off by Bodies reſpectfully dry, and the former Diſtinction was invented only to ſolve theſe Phænomena of which we have been ſpeaking, that is the Miſt riſing and diſperſing without Rain, and the Miſt condens'd and reſolv'd into Rain, which as I have ſhewn may be much better explain'd without any ſuch Diſtinction.

IX

A general Miſt before the Sun riſes, near the full Moon. } Fair Weather.

THIS is a general and a very extenſive Obſervation which enables us to judge of the Weather for about a Fortnight, and there is very great Reaſon to believe that it will very rarely deceive us. In order to convince the Reader of this, it will be neceſſary to explain as far as we are able the Cauſes of this.

Miſts are obſerved to happen when the Mercury in a Barometer is either very low or very high. They happen when it is high after the Region of the Air has continued calm a good while, and in the mean Time a great Abundance of Vapours and Exhalations have been accumulated making the Air dark by their Quantity, and the diſorderly Diſpoſition of their Parts. They happen when the Mercury is low, ſometimes becauſe the Rarity of the Air renders it unable to ſuſtain the Vapours which therefore deſcend and fall thro' it.

But none of theſe Caſes agree with the Obſervation at the Head of the Page, and therefore to form a true Judgment of the Weather, we muſt diſtinguiſh between them and the Caſe which explain the Obſervation.

X.

If in the new Moon. —— Rain in the old.

WHEN Exhalations riſe copiouſly from the Earth into the Region of the Air, and the Air itſelf is in a proper Diſpoſition, they aſcend to a great Height, and continue a long Time before they are condenſed, which accounts very clearly and philoſophically, for the interval of fair Weather between the riſing of theſe Miſts, and their falling down again in Showers. Their aſcending about Sun riſe is a Proof that the Air is thin, but at the ſame time of a Force ſufficient to ſuſtain them, ſince if the Miſts were not ſpecifically lighter than the Air itſelf they could not aſcend.

When the Moon is at the full, and ſuch Exhalations riſe plentifully, the time neceſſary for them to float in the Atmoſphere, before they are condenſed into Clouds and Rain, extends generally ſpeaking beyond the Period of that Moon, and therefore the Obſervation directs us to expect *fair Weather.*

XI.

If in the old. —— ——— Rain in the New.

BUT as it is obſerved not only in this Climate, but all the World over, that great Changes of Weather happen near the Change of the Moon, it follows that this is the Seaſon when theſe Exhalations that aſcend ſo plentifully at Sun riſing are condenſed, and conſequently is the Seaſon when we ought to expect *Rain.*

If therefore the Exhalations riſe in the new Moon, it is a Sign that the Air is in a fit Diſpoſition to ſuſtain and ſupport them for a conſiderable Time, and therefore we have Reaſon to pect that they ſhould continue floating till the next regular change of Weather, that is, till the old of the Moon, or rather till towards the next Change, and therefore the Obſervation is very cautiouſly and very properly worded, directing us to expect Rain *in* the old, and *in* the new, and not *at* the old or new, becauſe it is obſerved that theſe Changes of Weather happen not exactly *at* the Change of the Moon, but a Day or two before or after, of which the Reader will meet with many Examples in Captain *Dampier's* Hiſtory of Winds and Storms at Sea.

WINDS.

XII.

WINDS. *Obſerve that in eight Years Time there is as much South Weſt Wind, as North Eaſt, and conſequently as many wet Years as dry.*

THIS muſt be allow'd a very extraordinary Aphoriſm from a Country Shepherd, but at the ſame Time it is very agreeable to the Obſervations of Dr. *Hooke*, Dr. *Derham*, Dr. *Grew*, and other able Naturaliſts, who with unwearied Pains and Diligence have calculated the Quantity of Rain falling in one Year, and compared it with what fell in another. Lord *Bacon* that Honour to our Nation, and the Age which produced him; informs us, that it was an old Opinion there was a total Revolution of the Weather once in forty Years, and wiſhes it was inquired into. I cannot tell whether this has ever been done or not, but I think there is good Reaſon to conclude, that there is a natural Ballance eſtabliſhed of wet and dry Weather, as of Light and Darkneſs, Heat and Cold, and other ſuch like Variations.

It may not be amiſs to caution the Reader againſt a Miſtake into which the Manner of this

Rule being ſtated may eaſily lead him. It is this that South Weſt Winds cauſe Rain, and North Eaſt Winds fair Weather, which however is not a Thing clear or certain by any Means. This indeed is true that South Weſt Winds and Rain, North Eaſt Winds and fair Weather come together generally ſpeaking. But the Queſtion is which cauſes the other, and a more difficult Queſtion cannot eaſily be ſtated, becauſe there ſeems to be Facts on both ſides. South Weſt Winds ſeldom continue long without Rain, this ſeems to prove the affirmative, but on the other Hand, when in hard Weather, Rain begins to fall, the Wind commonly veers to the South Weſt, this looks as if the Rain cauſed the Wind.

But to keep cloſe to the Shepherds Obſervation. There is one Thing ſeems ſtrongly to confirm it, which is this, that in any given Place the Quantity of Rain one Year with another is found to be the ſame by Experience, according to which the following Table has been calculated, for the mean Quantity of Rain falling one Year with another in thoſe Places that are mentioned, and on this Proportion the other ſeems to be founded.

At	Harlem	24 Inches
	Delf	27
	Dort	40
	Middleburg	33
	Paris	20
	Lyons	37
	Rome	20
	Padua	37½
	Piſa	34¼
	Ulm	27
	Berlin	19½
In	Lancaſhire	40
	Eſſex	19½

XIII.

When the Wind turns to North Eaſt, and it continues two Days without Rain, and does not turn South the third Day, nor Rain the third Day, it is likely to continue North Eaſt, for eight or nine Days, all fair; *and then to come to the South again.*

IN my Opinion this and the ſubſequent Remarks depend intirely upon Obſervations, and may ſerve rather to found an Hypotheſis, than ſeem to be deduced from one. That the Variations of the Wind depend on certain Cauſes and may conſequently be reduced to Rules is highly probable, and ſuch Obſervations as theſe render it in a manner certain. But to explore theſe Cauſes, and to explain them in ſuch a manner as to account for theſe Phenomena in a ſatisfactory manner, requires not only great Sagacity but much Experience, and many years Obſervation which however conſidering the great Benefits that would reſult to mankind from eſtabliſhing ſuch a THEORY, would be Time well beſtowed.

We may however eaſily conceive that a conſtant North Eaſt Wind muſt be accompanied with fair Weather. For whatever the cauſes of Winds may be yet on this ſide the Equator, a ſtrong and ſettled North Eaſt always bouys up the Clouds and keeps them ſuſpended. This has been long obſerved by, and paſſes for a ſettled point amongſt Seamen. The Reaſon of it however cannot be ſo eaſily aſſigned, at leaſt a ſatisfactory Reaſon, for as to Suppoſitions every fanciful Man can furniſh them at Pleaſure.

This as well as the following Obſervations very plainly and clearly prove, that in this Part of the World fair weather attends one Wind, and wet another, but which is the Cauſe, and which is the effect, or whether both are not the effects of ſome other Cauſe, I pretend not abſolutely to determine. But inaſmuch as it is certainly known, that Rains attend in other Climates, thoſe Winds that are here attended with fair Weather, it ſeems more agreeable to ſuppoſe that rainy Weather is occaſioned chiefly to Weſt Winds, becauſe loaded with moiſt Vapours from the Sea.

XIV.

If it turn again out of the South to the North Eaſt with Rain, and continues in the North Eaſt, two Days without Rain, and neither turns South nor rains the third Day, it is like to continue North Eaſt for two or three Months.

The Wind will finiſh theſe Turns in three Weeks.

THIS Obſervation is of the ſame nature with the former, and is plainly deduced from long Experience. Our Author ſeems to contradict himſelf in ſaying that theſe Winds finiſh their Turns in three Weeks, but his true Meaning certainly is that they are about three Weeks in turning from the South to the North-Eaſt again. Some very great Men have laid it down as a Thing certain, that the Variations of the Wind are to be accounted for by the Alteration of the Balance of the Air occaſioned by the different Effects of Heat and Cold; but other Writers again inſiſt very copiouſly on the Effects which Winds have upon the Air, and thus confound us in a Circle of Cauſes and Effects, whence it is plain that they do not throughly underſtand the Subject themſelves, and therefore it is no wonder that they are not able to explain it to others.

In ſome Parts of the World and eſpecially between the Tropick's the Winds are regular, and therefore our Philoſophers ſeem to talk more rationally about them. But in our Northern Countries the Alterations of the Wind are ſo frequent ſudden and often ſo little agreeable to the Seaſon that ſuch general Reaſonings will by no means ſerve to explain them. It is however very reaſonable to ſuppoſe that the ſame general Cauſe prevails here as between the Tropicks, but with leſs certainty, becauſe the Power of the Sun is not ſo great, and the Determination of the Winds depends on the Situation of Mountains, Rocks and Woods, which direct the Air driving againſt them into certain Courſes, ſo that it is impoſſible to explain or indeed to judge of the Courſe of the Winds till the Country is thoroughly known, and all thoſe Eminences that can effect the Winds are well conſidered,

FROM theſe Reflections the Value of our Shepherd's Obſervations will clearly appear. He was not Philoſopher enough to talk in this Stile, but by a long and ſteady Attention he came to know experimentally, what perhaps few Philoſophers with all their Sagacity would have been able to have found out.

XV.

S. W. WINDS. *After a northerly Wind for the moſt Part two Months or more, and then coming South, there are uſually* three or four fair Days at firſt, and then on the fourth or fifth Day comes Rain, *or elſe the Wind turns North again*, and continues dry.

THIS is likewiſe a very judicious and a very uſeful Obſervation, and yet it is not a difficult Matter to account for it. It is a common Obſervation and a very true one, that there is uſually fair Weather before a ſettled Courſe of Rain. The Winds that bring the dark rainy Clouds that obſcure the Sky, and cauſe dull cloudy Weather, often raiſe theſe Vapours to ſuch a height, that they are attracted into the cold Region above our Sight, till being condenſed there, they fall down upon us again in Snow or Rain, according to our Authors Obſervation.

But if after a ſeeming Tendancy to Rain there follows ſeveral Days of fine Weather, it is a certain Indication that the Temper of the Air is altered, and that theſe Vapours had been driven off before they had Time to condenſe, which is confirmed by the Change of the Wind on ſuch Occaſions.

All theſe Obſervations are to be underſtood in a proper Latitude, and not ſtrictly and according to the very Letter. For Rain may fall the ſixth or ſeventh Day, or the Wind may change the ſecond or third. Beſides a Man who would make uſe of theſe Obſervations in the Country, muſt conſider attentively the Situation of the Place where he lives, the bearing of the Sea, Marſhes, Ponds, Lakes, Woods, Mountains, Rocks, *&c.* For without making proper Allowances for theſe, all ſuch Obſervations on the Weather will be apt to fail him.

XVI.

If it returns to the South within a Day or two without Rain, and turn Northward with Rain, and return to the South, in one or two Days as before two or three Times together after this Sort, then it is like to be in the South, or South Weſt, two or three Months together, *as it was in the North before.*

The Winds will finiſh theſe Turns in a Fortnight.

THIS may appear a little perplex'd to an ordinary Reader, but a little Attention will make it very clear and plain, and whoever conſiders what mighty Uſes may be made of the Foreſight of Weather for a Month or two, will not think this Labour ill beſtowed. I muſt confeſs I look upon theſe three Rules in Relation to the Wind as the moſt uſeful in the whole Collection. Eſpecially to Farmers and Country People, to whom they are of the greateſt Conſequence.

But it is a common Thing for ſuch People to ſay, what Certainty is there that theſe Rules will prove true, what Probability is there that the Wind ſhould continue ſo long in one Quarter, and then ſo long in another, how ſhall we be ſatisfied that there is any Truth in this, or if we cannot be ſatisfied as to the Truth of it, why ſhould we depend upon any ſuch like Obſervations?

To this I anſwer, that they may have reaſonable Satisfaction given them on this Head. Some of our great naturaliſts, who had kept Journals of the Weather for many Years, have found that the ſame Wind blows every Year very near the ſame number of Days, and that there is a regular Continuance of different Winds annually in every Country. For Inſtance,

At *Utrecht* they blow thus,

The N. Wind	42 Days
The N. W.	33
The W.	77
The S. W.	58
The South	33
The S. E.	26
The E.	53
The N. E.	43
	365

At

It is a Thing plain to every Capacity, that a Journal or Diary of the Winds may be kept any where, and if from ſuch a Journal it appears that a given Wind blows for a certain Number of Days, then it follows that if theſe can be determined with Certainty, the Time of their blowing may alſo be determined at leaſt with great Probability, which is as ſatisfactory an Anſwer as can be juſtly expected, becauſe it ſhews that there is a juſt and rational Gound for confiding in ſuch Obſervations, when confirmed by long Experience.

XVII.

Fair Weather for a Week with a Southern Wind is like to produce a great Drought, *if there has been much Rain out of the South before. The Wind uſually turns from North to South, with a quiet Wind without Rain but returns to the North, with a ſtrong Wind and Rain; the ſtrongeſt Winds are when it turns from South, to North by Weſt.*

N. B. *When the North Wind firſt clears the Air (which is uſually once a Week) be ſure of a fair Day or two.*

OBSERVATIONS of this Nature upon Winds have employed the ableſt Heads in all Ages. *Pliny* the great Naturaliſt has left us a great deal upon this Subject, which plainly proves that it has been the Opinion of the ableſt and wiſeſt Men that ſtudy, and Experience might reduce even Things of ſuch ſeeming Incertainty under ſtated Rules, and within the Bounds of a regular Syſtem. For Inſtance he tells us.

" In *Africa* the South Wind is Serene, the " North Eaſt cloudy. All the Winds have " their turns. To judge rationally of their Changes, the fourth Day of the moon is to be regarded.—— The South Wind blows ſtronger than " the North Eaſt, becauſe the former riſes from " the Bottom, whereas the latter comes from the " ſurface of the Sea. It is for this Reaſon that thoſe " Earthquakes are moſt dangerous that follow after a South Wind."

In order to underſtand this Notion of *Pliny*, we need only advert to the Account given us by the Reverend Mr. *Robinſon* in his natural Hiſtory of *Weſtmoreland*, which is exceedingly curious, and well worthy of the Readers peruſal. This ingenious Gentleman is of Opinion that Winds have their original from the Sea, of which he gives the following very probable Account.

" It, that is, the Wind, proceeds from vaſt " ſwarms of nitrous Particles ariſing from the " bottom of the Sea, which being put into Mo-

" tion, either by the central Fire, or by the Heat " and Fermentation which abounds in this great " Body of the Earth ; and therefore the firſt Commotion excited by the ſaid Fermentation? we " call a *Bottom Wind*, which is preſently diſcovered " by Porpices and other Sea Fiſh, which delight " in ſporting and playing upon the Waves of the " Sea, and by their playing give the Mariners " the firſt Notice of an approaching Storm.

" When theſe nitrous ſwarms are riſen towards " the Surface of the Sea in a dark Night, they " cauſe ſuch a ſhining light upon the Waves, as " if the Sea was on fire. And being delivered " from the brackiſh Water and received into the " open Air, thoſe fiery and ſhining Meteors " which fix upon the Maſts and Sides of the Ships, " and are only nitrous particles condenſed by the " circumambient Cold, and like that which the " Chymiſts call Phoſphorus or artificial Glow-worm, ſhine and caſt a Light but have no " Heat: This gives the Mariners the ſecond Notice that the Storm is riſing, for upon the firſt " breaking out of the Wind the Sea begins to " be rough, and the Waves ſwell and riſe, when " at the ſame Time the Air is calm and clear.

" This boiling Fermentation of the Sea cauſes the " Vapours to riſe, which by the Intenſeneſs of the "circumambient Cold are condenſed into thick "Clouds, and fall down in Storms of Wind and "Rain, firſt upon the Sea from whence they "roſe, and then the attractive Power of the "Mountain-cold by a ſecret Magnetiſm between "Vapour and Cold, attracts the wateriſh Va- "pours intermixt with nitrous Particles to the "high Tops of Mountains and Hills, where they "hang hovering in thick Foggs, and wateriſh "Miſts, untill the Atmoſpherical Heat rarifies "the nitrous Part of the Fog, (which is always "uppermoſt and appear white and tranſlucent) "into briſk Gales of Wind, and the Intenſeneſs "of Atmoſpherical Cold having attracted the Va- "pours into the colder Regions of the Air, where "being condenſed into Clouds, the Wind breaks "diſſipates and drives them before it, till they "fall down in Rain, and water the Surface of "the Earth. And this ſeems to be the Reaſon "why in *Egypt* and thoſe level Countries where "they have no Mountains, they have little Wind "and leſs Rain."

XVIII.

CLOUDS *In Summer or Harveſt, when the Wind has been South two or three Days, and it grows very hot, and you ſee Clouds riſe with great white Tops like Towers, as if one were upon the Top of another, and join'd together with black on the nether Side,* there will be Thunder and Rain ſuddenly.

WE may very eaſily account for this Obſervation, becauſe in Fact the Signs here mentioned are no other than Natures apparatus, for a Storm of Thunder and lightning which will be perfecty underſtood, by attending a little to the Cauſes of theſe Meteors. Lightening is a great flame, very bright, extending every way to a great diſtance, ſuddenly darting upwards there ending, ſo that it is only momentaneous. The Matter which produces the Fire, is the Oyl of plants, attenuated by the heat of the Day, and raiſed on high. Then whatever has exhaled from the Earth, that is ſulphurious or Oily, which is diſperſed up and down in the Atmoſphere and is not continuous, is ſet on Fire by Turns, and the

Flame dilates itſelf as far as the Tract of that Exhalation reaches. Some other Subſtance pendant and floating in the Air meets with this alſo, with which it excites an efferveſcence, takes Fire and flaſhes along with it. Thunder is another bright Flame, riſing on a Sudden, moving with great Violence, and with a very rapid Velocity through the Air, according to any Determination upwards from the Earth Horizontally, obliquely, downwards in a right Line, or in ſeveral right Lines as it were in ſerpentine Tracts joined at various Angles, and commonly ending with a loud Noiſe or Ratling.

It is obſerved that it Thunders moſt when the Wind blows from the South, and leaſt when it blows from the Eaſt. The great Principle of Thunder is Sulphur, as is evident from the Smell it leaves behind it, but in order to occaſion ſuch an Exploſion, there muſt be other Ingredients mixed therewith, eſpecially Nitre, of which the Air is always full, beſides other Things, of which it is impoſſible to give any Account. The Tracts of this Sort of Matter fly about in the Air, and are as it were Lines of Gunpowder, and as in the firing of that Powder, the Fire begins at one End, and purſuing its Aliment proceeds to the other Extremity, and ſo the whole Maſs of Powder is fired; we may from thence account for the Phænomenon of Thunder. For in like Manner thoſe inflamed Tracts which are ſuſpended in the Air, flaſh from a Flame that runs from one Extream to the other wherever the Vain of Nouriſhment leads it. Hence thoſe Rays of Thunder, which ſeems to be brandiſhed through the Air, and ſometimes to be ſplit in two or more Tracts, and ſometimes to return back, at other Times, to be projected in Lines that are joined by various Angles, and this only becauſe the Flame meets with Tracts lying in various Situations that cohere one with another. Therefore Thunder ſeems now to run horizontally, now from above downwards, now upwards from the Earth, for if the Matter of Thunder preſſing out of the Earth is enflamed near the Ground, the Flame darting upwards, the Thunder will ſeem to be projected out of the Earth. If the ſame Tract be ſet on Fire at its upper end, the Flame will move downwards, and the Thunder will ſeem to deſcend out of the Sky.

Hence we eaſily underſtand how it comes to thunder oftener in one Place than another, but moſt frequently in thoſe where the Soil produces odoriferous Herbs, and abounds with Sulphur, and where the People are much expoſed to the extream Heat of the Sun. Thunder is leſs frequent in Places where there are few odoriferious

Herbs, very little Sulphur, or where the Climate is watery and moiſt. For Inſtance it thunders very much in *Italy* and *Sicily*, and very rarely in *Egypt*, and the adjacent Countries. If it be demanded how it comes to thunder in the midſt of the Ocean? The Anſwer is eaſy, becauſe from the Bottom of the Ocean vaſt Tracts of ſulphureous Matter, are caſt up through the Waters; as it happens to ſpring Waters in ſeveral Places, the Streams of which will take Fire from a lighted Candle. For ſulphureous Exhalations burſting out together with the Waters, the fulmineous Matter in the Air, is ſet on Fire when it meets with Exhalations or Vapours, with which it can exhite a vehement Efferveſcence. It is very clear from this Account, that the Clouds mentioned at the Top of the twenty eighth Page are Thunder Clouds, or Clouds big with the Materials of Thunder.

XIX.

If two ſuch Clouds ariſe, one on either Hand, it is Time to make haſte to ſhelter.

AS this Obſervation is of the ſame Nature with the former, we ſhall continue our Remarks. The Reaſon why it ſeldom thunders in Winter is, becauſe the exteriour Parts of the Earth are ſo contracted by the cold Snow and Ice, that Sulphur cannot perſpire in any great Quantities, but as ſoon as the Earth begins to be opened by the Sun in the Spring, ſomething expires in the Month of *April* which takes Fire. But by the greater Heat of the Sun penetrating deeper into the Earth, the Cortex is more opened in *May*, and now there is a more copious Expiration of the fulminating Matter, and whatever was collected and ſhut up in Winter, is now releaſed and ſnatched up in the Air, and thence proceeds the moſt frequent Thunders in the Month of *May*, and chiefly when a very hot Day or two has gone before. A leſs Quantity of the ſame, Matter remains in the upper Cortex of the Earth for the Month of *June*, but in the mean Time a Stock ariſes out of the deeper Bowels of the Earth, which is attenuated and prepared, ſo that by the very fervent Heat of *July* it is elevated, as it were in heaps, and ſet on Fire. Hence Thunder is as frequent in *July* as in *May*. And the Heat decreaſing in the ſucceeding Months, the Exhalation of the fulminating Matter out of the Earth is more ſparing, and thence alſo the Thunder is leſs frequent till in *October*, and the other winter Months the Earth is bound up with us, and hardly expires any more. Hence we ſee why it very ſeldom Thunders when the Notherly Winds blow, for theſe Winds conſtringe the

Earth with their Cold, and ſo hinders the fulminating Matter from burſting forth, and when they are burſt forth and floating in the Air, they hinder their Effervency. But on the contrary when the Warm and moiſt South Wind blows; which opens every Thing, the Earth likewiſe is opened, and abundance of fulminating Matter is expired and aſcends on high, which is there eaſily enflamed.

As the Flame runs very ſwiftly it ſeems to carry along with it Particles, which it could not ſo eaſily ſet on Fire, and when any of theſe Particles are drawn together, and heated to a certain Degree, they at laſt take Fire with a ſudden and great Exploſion, and thereby produce what we call a thunder Clap. Now though this be only a ſingle Sound, yet it is often heard in the Form of a great murmuring Noiſe of a long Continuance; ſometimes for thirty or forty Seconds, becauſe of its various Repercuſſions by the Clouds and terreſtrial Obſtacles. Hence it is, that in Vales which are ſurrounded by Mountains of a different Height, there is a terrible and long continued Bellowing of Thunder Claps. Whereas for one Exploſion it has been obſerved that there is but one Clap. Yet however if the Flame ſet Fire to two, three or more fulmineous Tracts, each of them at laſt will end in a Clap, and thus ſeveral Sounds may be heard together or quickly ſucceeding one another.

XX.

If you ſee a Cloud riſe againſt the Wind or ſide Wind, when that Cloud comes up to you, the Wind will blow the ſame Way that the Cloud came. And the ſame Rule holds of a clear Place, when all the Sky is equally thick, except one clear Edge.

THIS ſeems to ariſe from hence, that Wind being nothing more than Air in motion, the Effects of it firſt diſcover themſelves above, and actually drive ſuch Clouds before them. This was long ago obſerved by *Pliny*. When Clouds ſays he float about in a ſerene Sky, from whatever Quarter they come, you may expect Winds. If they are collected together in one Place they will be diſperſed by the Approach of the Sun. If theſe Clouds come from the North Eaſt, they denote Winds, if from the South great Rains. But let them come from what Quarter they will, if you ſee them driving thus about Sun ſet, they are ſure Signs of an approaching Tempeſt.

If the Clouds look duſky, or of a tarniſh ſilver Colour, and move very ſlowly, it is a Sign of

Hail. But to ſpeak more plainly thoſe very Clouds are laden with Hail, which if there be a Mixture of Blue in the Clouds will be ſmall, but if very yellow large. Small ſcattering Clouds that fly very high, eſpecially from the South Weſt, denote Whirlwinds. The ſhooting of fallen Stars through them, is a Sign of Thunder. We meet with many Obſervations of this Sort in our old Writers on Huſbandry, and we have abundance of Proverbs relating to this Subject which are worth obſerving, and the rather, becauſe moſt of them are not peculiar to our Language only, but common to us with many of our Neighbours. It is the Remark of Lord *Bacon*, and a very judicious Remark too, that Proverbs are the Philoſophy of the common People, that is to ſay, they are trite Remarks founded in Truth, and fitted for Memory. I muſt confeſs that there are ſome of them that ſeem either falſe or of no great Conſequence, but then I am apt to ſuſpect that by various Accidents we have loſt their true Meaning, or elſe that in length of Time, they have been altered and corrupted, till they have little or no meaning at all.

I cannot help taking Notice in Regard to the Rule before us, that Captain *Dampier* tells us in the *Eaſt Indies*, they have always Notice of a Tuffoon by the Skies being firſt clear and calm, and then a ſmall white Cloud hanging preciſely in the Point from whence the Storm comes, where he obſerves that it remains ſometimes twelve Hours or more, and adds, that as ſoon as it begins to move, the Wind preſently follows it. When Sir *John Bury* who dyed an *Engliſh* Admiral, had the Command of a ſmall Frigate in the *Weſt Indies*, he eſcaped a Hurricane in the *Leward* Iſlands, by taking the Advice of a poor Negroe, who ſhewed him a ſmall white Cloud at a Diſtance, and aſſured him that when it came to the *Zenith*, the Hurricane would infallibly begin as indeed it did.

XXI.

Sudden Rains never laſt long: *But when the Air grows thick by Degrees, and the Sun, Moon and Stars ſhine dimmer and dimmer, then it is like* to rain ſix Hours uſually.

RAIN is properly ſpeaking a Multitude of ſmall watry Drops, falling from the upper Air at different Seaſons. When the upper Regions become cold of a ſudden, the watry Clouds are condenſed and fall in haſty Showers. It is obſerved that mountainous Countries have moſt Rain, and the Reaſon ſeems to be the Winds driving the Clouds againſt the Rocks and Hills, and thereby compreſſing them in ſuch a Manner, that they are immediately diſſolved, and fall as it were at once. This is the Reaſon that in *Lancaſhire*, there falls twice as much Rain as in *Eſſex*, and it is probably from the ſame Cauſe, that in the Ocean overagainſt the mountainous Coaſt of *Guinea*, ſhowers ſometimes fall as it were by pailfulls.

This Obſervation of our Shepherd is very juſt and reaſonable, and I dare ſay will hardly ever fail ſuch as obſerve it. The Dimneſs of the Stars and other heavenly Bodies, is one of the ſureſt Signs of very rainy Weather. It is likewiſe to be obſerved that when the Stars look bigger than uſual, and are pale and dull and without Rays, this undoubtedly indicates that the Clouds are condenſing into Rain which will very ſoon fall, and it has been obſerved that when the Air grows thick by Degrees, and the Light of the Sun leſſens ſo as not to be diſcerned at all, and again when the Moon or Stars have the ſame Appearances, a continued Rain for at leaſt ſix Hours is ſure to follow.

To be the better informed in ſuch Caſes, it is beſt to have Recourſe to a Variety of Signs, for it is not only the Clouds and Sky, or the Sun, Moon and Stars, that give us previous Notice of rainy

Weather, but almoſt every Thing in the Creation, and Vegetables particularly. As for Inſtance, the Pimpernel which is a very common Flower, ſhuts itſelf up extreamly Cloſe againſt rainy Weather. In like Manner the Trefoil ſwells in the Stalk againſt Rain, ſo that it ſtands up very ſtiff, but the Leaves droop and hang down. Even the moſt ſolid Bodies are affected by this Change of the Atmoſphere, for Stones ſeem to ſweat, and Wood ſwells, the Air driving the moiſt Particles with which it is filled into the Pores of dry Wood eſpecially; make it ſwell prodigiouſly, and this is the Reaſon the Doors and Windows are hard to ſhut in rainy Weather.

This is ſo true, that there has been a Method found of dividing Mill-ſtones by the mere Force of the Air, which is done in this Manner. They divide a Block of this Kind of Stone as big as a large rolling Stone, into as many Parts as they deſign to make Mill-Stones, and in the Circles where this Block is to be divided, they pierce ſeveral Holes, which they fill with Sallow Wood dry'd in an Oven, and expoſe the Stone to the Air, in moiſt Weather; when the Wood ſwells to ſuch a Degree as to ſplit the Stone as effectually, as if it was done by iron Wedges driven by Sledge-Hammers. This curious and extraordinary Method of dividing Mill-Stones, is related by the famous Mr. *Ozanam* of his own Knowledge.

XXII.

If it begin to Rain from the South, with a high Wind for two or three Hours, and the Wind falls, but the Rain continues, it is like to rain twelve Hours or more, and does uſually rain till a ſtrong North Wind clears the Air. *Theſe long Rains ſeldom hold above twelve Hours, or happen above* once a Year.

THIS depends intirely upon Obſervation, and Experience ſhews us that whenever the Wind falls, Rain follows. It has been likewiſe obſerved, that when the Wind changes often there fall heavy Rains. All theſe Alterations in the Atmoſphere, are leſs obſerved by Men, than by Animals for two Reaſons. The firſt is, that we live much within Doors, by which they are leſs obvious to us, and it is for this Reaſon that the Huſbandmen, Seamen, Fiſhermen, but above all Shepherds, who are more in the open Air than other Men, are better acquainted with, and more able to diſtinguiſh and judge of the Signs of the Alteration of the Weather, than thoſe who live altogether within Doors, or go out but ſeldom.

Another Reaſon is our having ſo many Things to mind, which takes off our Thoughts, and renders us leſs Attentive to the Signals which would give us Notice of ſuch Alterations. It is for this Reaſon that we ought to ſerve our ſelves of that Sort of Inſtinct, which Nature has given to other Animals, and which as it is a Gift of Nature, is in a Manner infallible.

Thus if ſmall Birds prune themſelves and duck and make a ſhew of waſhing. If Crows make a great Noiſe in the Evening. If Geeſe gaggle more than uſual, theſe are all Signs of Rain, becauſe theſe Animals love wet Weather, and rejoice at the Approach of it. On the other Hand if Oxen lye on their right Sides, look towards the South, and lick their Hoofs. If Cows look up in the Air, and ſnuff it, if Aſſes bray violently, and if Cocks crow at unuſual Hours, but eſpecially when a Hen and Chickens croud into the Houſe, theſe are ſure ſigns of Rain.

Inſects alſo are very ſenſible of ſuch changes of Weather. Frogs croak more than ordinary, Worms creep out of the Ground, Moles throw up more Earth than uſual, becauſe ſuch Weather is more agreeable to them, Hornets, Waſps and Gnats, ſting more frequently againſt wet Weather than in fair. Spiders are reſtleſs and uneaſy, and frequently drop from the Wall, the humid Air getting into their Webbs and making them heavy. But the ſureſt and moſt certain Sign is taken from Bees, which are more incommoded by Rain than almoſt any other Creatures, and therefore as ſoon as the Air begins to grow heavy, and the Vapours to condence, they will not fly from their Hives, but either remain in them all Day, or elſe fly but to a ſmall Diſtance.

XXIII.

If it begins to rain an Hour or two before Sun riſing, it is like to be fair before Noon, and ſo continue that Day, *but if the Rain begin an Hour or two after Sun riſing, it is like* to rain all that Day, *except the Rainbow be ſeen before it rains.*

THIS is a ſhort clear and eaſy Obſervation, and therefore I ſhall not dwell long upon it, but rather entertain the Reader with a few Obſervations on the Rain-Bow. Whenever it appears Things are thus circumſtanced. The Spectator has the Sun behind him, and Clouds with the Bow in them before him. Sometimes there are two and even three Bows ſeen, but this is very rare. The Colours in the Bow are ranged in this Order, *viz.* Violet, Purple, Blew, Green, Yellow, Orange, Red. After a long Drought the Bow is a certain Sign of Rain, if after much Wet fair Weather. If the green be large and bright it is a Sign of Rain, but if the Red be the ſtrongeſt Colour, then it denotes wind and Rain together. If the Bow breaks up all at once there will follow ſerene and ſettled Weather. If the Bow be ſeen in the Morning ſmall Rain will follow. If at Noon, ſettled and heavy Rains, if at Night fair Weather. The Appearance of two or three Rain-Bows ſhew fair Weather for the Preſent, but ſettled and heavy Rains in two or three Days time.

Lunar Rain-Bows are ſometimes, but very ſeldom ſeen, they are extreamly beautiful, but much leſs than thoſe that appear in the Day time, and a Yellow or rather a Straw-Colour prevails moſt. As they happen ſo ſeldom, they cannot well be reckoned amongſt the Signs of Weather. But now after ſpeaking of ſo many different Methods of judging when rainy Weather will be of a ſhort or long Continuance: Give me leave to deſcribe two or three Inſtruments eaſily made which will ſhew the Alterations of the Weather certainly conſtantly, and early enough for moſt Uſes.

There were ſome Years ago a Sort of Toys ſold with a Man and a Woman, ſo fixt before the Door of a Houſe, that at the Approach of wet Weather the Woman entered it, and when the

Weather grew fair the Man. This was done by the help of a Bit of Catt-Gutt, which ſhrinks in wet Weather, and ſtretches again when it is fair. This appears better by a Line and Plummet, eſpecially if the Line be made of good Whipcord, that is well dryed, for then if it be hung againſt a Wainſcot, and a line drawn under it exactly where the Plummet reaches, in very moderate Weather it will be found to riſe above it before Rain, and to ſink below when the Weather is like to become fair, but the beſt Inſtrument of all is a good pair of Scales, in one of which let there be a braſs Weight of a Pound, and in the other a Pound of Salt, or of Salt Petre well dryed, a Stand being placed under the Scale, ſo as to hinder its falling two low. When it is inclined to Rain the Salt will ſwell, and ſink the Scale, when the Weather is growing fair, the braſs Weight will regain its Aſcendency.

XXIV.

SPRING & SUMMER. *If the laſt eighteen Days of* February *and ten Days of* March *be for the moſt Part* rainy, *then the* Spring *and* Summer *Quarters are like to be ſo too: and I never knew* a great Drought *but it enter'd* in that Seaſon:

IT is eaſy to diſcover by Obſervation, whether this Rule be well or ill founded, that is to ſay, whether our Shepherds Obſervation will ſerve for other Places or not, and where it will ſerve and where not. But it may not be amiſs to remark that it is highly probable, or rather abſolutely certain, that the Weather in one Seaſon of the Year determines the Weather in another. For Inſtance, if there be a rainy Winter, then the Autumn will be dry, if a dry Spring than a rainy Winter. Our Forefathers had abundance of odd Sayings upon this Subject, and ſome Proverbs for every Month in the Year, but I doubt they were indifferently founded, however there can be no harm in obſerving them in order to diſcover whether there be any Thing in them or not.

Janiver freeze the Pot by the Fire
If the Graſs grow in *Janiveer*
It grows the worſe for't all the Year.
The *Welchman* had rather ſee his Dam on the Beir
Than to ſee a fair *Februeer.*
March Wind and *May* Sun
Makes Clothes white and Maids Dun.
When *April* blows his Horn
It's good both for Hay and Corn.
An *April* Flood
Carrys away the Frog and her Brood.
A cold *May* and a windy
Makes a full Barn and a Findy.
A *May* Flood never did good.
A ſwarm of Bees in *May*
Is worth a load of Hay.
But a Swarm in *July*
Is not worth a fly, *&c.*

XXV.

WINTER *If the latter end of* October *and beginning of* November *be for the moſt Part warm and rainy, then* January *and* February are like to be froſty and cold, *except after a very dry Summer.*

IT is very evident ſuppoſing this Obſervation to be true, as I am pretty confident it is, that the Reaſon of it is to be ſought in that Ballance of the Weather, which Providence has eſtabliſhed. There is not only a Time to ſow, and a Time to reap, but there is a Time alſo for dry and a Time for wet Weather, and if theſe do not happen at proper Seaſons, they will certainly happen at other Seaſons, for not only the Wiſdom of Philoſophers hath diſcerned, but their Experiments and Obſervations hath put it out of doubt, that there is a certain Rule or Proportion obſerved between wet Weather and dry in every Country, ſo that it is nearly the ſame in every annual Revolution, neither is it wet and dry weather only, but hot and cold, open and froſt, that are thus regulated, from whence we ſee, that when the Scripture repreſents to us Gods ſettling Things by Weight and

Meaſure, it ſpeaks not only elegantly, but exactly. For we do not mean by Providence any extraordinary or ſupernatural Interpoſition of almighty Power, but the conſtant and ſettled order eſtabliſhed by the Will of that almighty Being, which we commonly call Nature.

There is nothing eaſier than for vulgar Underſtandings to miſtake the Meaning of Words, and by a Superſtition natural to weak Minds, convert what they imperfectly underſtand into Notions that perplex and confound them. Hence it proceeds that in common Converſation one hears People ſpeak of Nature as of a Being, or a Kind of ſubordinate Deity, whereas in Reality the true Meaning of Nature is, that Order or Law which God has eſtabliſhed in the Univerſe, and the Knowledge of Nature is no more than the Light we acquire by Study into the Connection of thoſe Laws. In this Senſe Experience is a Kind of Revelation, that is to ſay, it is a Sort of Knowledge that comes to us from without, and is infallible in itſelf, we may indeed go on wrong and deceive ourſelves in the Arguments we raiſe from it, but the Knowledge grounded upon Experements never varies.

This is ſufficient to ſhew us how much wiſer a Thing it is to truſt this Sort of experimental Knowledge, than to put any Faith in that kind of idle Science which amuſed our Foreſathers, and enabled Almanac Makers to delude and miſlead them. It is true we uſe the Luminaries as well as they, but then we uſe them in a rational Manner, and do not pretend to impoſe this or that Sign upon other People, but barely ſet down our own Obſervations, which are to be examined and vereſied by the Experience of thoſe to whom they are ſubmitted. The Aſtrologer on the other Hand inſiſts, on what are not in Nature; the twelve Houſes are a mere Invention, and ſo are all the Properties aſcribed to the celeſtial Signs, and to the Planets; mere Dreams and Fictions deviſed by the cunning to cheat and impoſe upon the ignorant, and which had been long ago exploded if People had brought them to the only Teſt of which they are capable, I mean that of Experience; with which they never did, never will, and indeed never can agree, whereas the Rules given by our Shepherd, are ſuch as we have ſhewn, ſuit perfectly well with the Remarks of other ſtudious Perſons in all Ages.

XXVI.

If October *and* November *be Snow and Froſt, then* January *and* February *are like to be* open *and* mild.

AS this Obſervation ſtands on the ſame Foundation with the laſt, we need not dwell upon it particularly, and therefore I ſhall proceed with my former Reflections. The only Way to be acquainted with Nature, is to ſtudy Nature. All Syſtems of humane Invention that are not built upon Experiments, are ſooner or later found to be falſe, becauſe to ſay the Truth, they are nothing better than ingenious Contrivances invented by the Wit of Man, to conceal his Ignorance. In order to account for what we behold, we muſt firſt of all take Pains to be well acquainted with the Fact, and not ſuffer our ſelves to be led away by Opinion. In order to explain what I mean, I ſhall give an Inſtance. All the World knows that not only the vulgar, but the learned were for many Ages in a conſtant Error about Corruption, and really believed that the heat of the Sun, and even animal Heat produced Worms, Maggots, and other living Creatures. Many grave Writers carry'd the Thing farther, and told us of Rats, Mice and other Creatures produced out of the Slime of the River *Nile*, by the Heat of the Sun in *Egypt*, which might very well paſs for Truth among thoſe who fancied they ſaw every Day ſomething of the like Nature: I mean in the Corruption of Fleſh and other Things, in which we behold Thouſands of living Creatures.

An *Italian* Philoſopher deſtroyed this whole Doctrine at once, by a ſimple and eaſy Experiment. He expoſed a Peice of raw Fleſh in a glaſs Veſſel well covered with Gauſe to the Air and Sun, and found that it putrefied without producing any living Creatures. This ſhews how careful we ought to be with Reſpect to Facts; for till this Experiment was made, no Body doubted that Vermin were bred by, as well as in putrefied Bodies, whereas we are now ſatisfied that the Heat of the Sun, can no more produce a Worm or a Maggot, than Horſe or an Elephant. By the ſame Examination we might open the Way to Knowledge, by driving out a Multitude of other Errors. But the Humour of taking Things for granted without enquiring into them, and then endeavouring to account for them by dint of Reaſoning; amuſes us with a falſe ſhew of Wiſdom, and encourages us to perſiſt obſtinately in the maintainance of weak and fooliſh Notions.

To apply this to the Subject of which we are treating. It is certainly a curious and a uſeful Thing to underſtand the Nature of the Weather, and to know how the Changes that happen in it come to paſs. The Buſineſs is to find out the true Way of coming at this kind of Knowledge, and upon the Principles that I have advanced, it is very evident that the only certain Way of coming at it, is by Obſervation. This is a ſlow but a ſure Method of arriving at Truth, and the Speciman here given us, of *one* Man's Obſervations, is enough to convince us that, a little Diligence and Application would ſoon go a great Way towards forming a Body of ſuch Obſervations, as might enable us to underſtand the Weather throughly, and to predict its Changes, and Alterations with a great Degree of Certainty. If we will not take this Pains, we muſt content ourſelves with what hath been already diſcovered, or if our Conditions of Life exclude us from the Opportunities of making ſuch Obſervations, it is certainly a right Thing to help ourſelves by enquiring into, and reaſoning upon ſuch Obſervations as other People have made, and to facilitate this as far as poſſible, I have taken the Pains to write this Commentary upon our Shepherds Rules; which I hope will render them more uſeful, or at leaſt ſecure them that Regard which they deſerve.

There remains therefore nothing more for me to do in order to recommend theſe Obſervations, but to ſay ſomewhat with Reſpect to the Utility of the Alterations of the Weather in general, and in particular; in order to ſatisfie the Reader, that there is nothing of Chance or Accident in ſuch Alterations, but that they are governed in every Reſpect by the ſame unerring Wiſdom, that at firſt framed and conſtantly preſerves the Univerſe. All Weathers are at ſometimes ſeaſonable, which ſhews that they are good in themſelves, and only accidentally evil. We ought not to meaſure Things of a general Nature, by particular Rules. If by the Direction of Providence the Succeſſion of Seaſons be ſuch, as that they turn to the good of Mankind in the whole; it is no Objection to, or Diminution of Providence that this Succeſſion of Seaſons ſhould at different Times be injurious to certain Countries, becauſe this may likewiſe be accounted for.

As to Particulars we will begin with the Air, which is compoſed of Exhalations of all earthly Bodies, as well ſolid as fluid, as alſo of Fire, whether of the Sun or the Stars, or of earthly Bodies burnt, or of Fire breaking out from the Entrails of the Earth, and aſcending, and tho' it be thus compounded, and hath ſwimming in it Multitudes of other Things, yet we find that it is perfectly wholeſom, is the Spring of Motion, and of Life to Men, and all other Animals; ſo that tho' we cannot account for, and perhaps have not a Power of comprehending how ſuch a mixed Body can be remedied ſalutary: yet ſince it is certain, that ſo it is, we have no Right to complain either of the evil Conſequences that ſometime attend the Exhalations with which it is filled, or the Accidents that flow from the frequent Alterations that happen therein, becauſe theſe have a viſible Tendancy to the general good, and are apparently neceſſary to the Preſervation of the Univerſe, ſo that before we can have any Title to find fault, we muſt firſt ſhew that we are capable of underſtanding them in their full Extent, and as *this* is impoſſible, it follows *that* muſt be unreaſonable.

But this appears ſtill the more clearly, when it is conſidered, that all ſuch Alterations may be ſhewn even from the Light of Reaſon to be generally uſeful, notwithſtanding they ſometimes appear troubleſome and noxious. For Inſtance, ſuch quick Streams of Air in Motion as we call Winds, though they ſometimes ſwell into Storms and Tempeſts, yet are they of great Benefit to Mankind, by purging the Air and many other Conſe-

Conveniences. It is a Proverb at *Vienna*, *that if* Auſtria *be not windy it is ſickly*, and this ſaying is no leſs true in other Countries, for by conſulting the Hiſtory of the laſt great Plague, that raged here in 1666, it will be found that there was in a Manner a dead Calm during the Time of the Sickneſs, and it is known in *Egypt* where they have Plagues annually, that the Change of the Wind delivers them from that Evil. Add to this the great Uſe of Winds in Navigation, and reflect on the Benefits that accrue therefrom, and we ſhall ſee no Cauſe whatever to doubt that this Motion of the Air is a very wiſe Contrivance.

The Condenſation of Vapours which is the Cauſe of Rain, is another great Benefit to the World, in as much as this is very probably ſuppoſed to be the Source of Fountains, Rivers, Lakes and other Magazines of freſh Water, without which the Earth would be uninhabitable, and to which in a very great Meaſure its Fertility is owing. We ought likewiſe to remember that tho' this be in itſelf ſo clear, and at the ſame time ſo certain, yet there are Countries in the World where it very ſeldom rains, as in *Egypt*, and others where it hardly ever rains, as in *Peru*; ſo that we ſee there is no raiſing general Doctrines upon this Subject, which ought to make us the more tender in diſputing the Will of Providence, or repining when it happens to croſs our own.

The Uſes of Snow are as great tho' leſs apparent, of which I ſhall mention but three. The firſt is its preſerving Herbs and Graſs in the Winter againſt the Severity of Froſt; ſecondly, its ſupplying Water to Brooks and Rivers; and laſtly, its furniſhing the Earth with vaſt Quantities of Nitre, and thereby conducing greatly to its Fertility, and perhaps the ſame thing may be ſaid of Froſt, hard Winters being often ſucceeded by luxuriant Summers, and thus we find that what in Appearance cauſes Scarcity, may in Reality produce plenty.

Laſtly, even Thunder however terrible in its Appearance, and ſometimes fatal in its Effects, is nevertheleſs very uſeful and Beneficial upon the Whole, for this likewiſe purifies the Air from ſulphureous and oily Exhalations, and the Rains that fall with it fertilize the Earth exceedingly. It alſo moderates the Heat as Experience teaches us, for as it is always gloomy and ſultry before Thunder, ſo it is afterwards generally cool and pleaſant. Theſe Remarks tho' very ſhort, may give the Reader an Opportunity of extending his Obſervations throughout all the Variations of Weather, and enable him to diſcern how uſeful and inſtructive a thing the Study of its Alterations may be, and how probable it is, that by proper Care and Attention we may arive at a much more uſeful, as well as a much more certain Knowledge in regard to the Weather, than hitherto has been attained.

I ſhall conclude by recommending to the Readers peruſal a very curious and entertaining Letter, tho' written in a plain familiar Stile, which will ſerve to exerciſe his Thoughts by affording him an Opportunity of endeavouring to account upon the Principles before laid down, for the ſurpriſing Varieties in that Climate, which has been hitherto reputed the moſt irregular, and the moſt unwholeſome in the World.

To Mr. *W. D.*ampier.

SIR,

I Have been very Ill ſince my return home with the Gout, ſo that I have not been capable of anſwering your Expectation, but being a little better recovered, I ſhall make as good a Return to your Enquiry of the *Harmatans* on the Coaſt of *Guinea*, as my Circumſtances will permit. Their uſual Time of blowing, is between the latter part of *December*, and the beginning of *February*, before and beyond which Seaſons they never exceed. They are of ſo very cold ſharp and piercing a Nature, that the Seams of the Floors of our Chambers, and the Sides and Decks of our Ships (as far as they are above Water) will open ſo wide, as that with Facility, you may put a caulking Iron a conſiderable Way into them, in which Condition they continue ſo long as the *Harmatan* blows, which is ſometimes two or three, and very rarely five Days, which is the very utmoſt I ever obſerved or heard of, and when they are gone they cloſe again, and are as tight as if it never had been. The Natives themſelves and all Perſons that inhabit thoſe Parts (during that ſhort Seaſon) to prevent their pernicious Effects, are obliged to confine themſelves within Doors, where they endeavour their own Security, by rendring their Habitations as cloſe and impenetrable as poſſible: Neither will they once ſtir abroad unleſs induced thereto by a more than ordinary occaſion. It is as deſtructive to the Cattle alſo, whoſe ſafe-guard conſiſts in their Proprietors care, who againſt this Seaſon ought to provide ſome ſuch like Place for them, otherwiſe they muſt expect but a pitiful Account when the Seaſon is over; for it moſt certainly deſtroys them, and that in a very ſhort Time.

This

This I accidentally experienced by expoſing a couple of Goats to the Aſperity thereof, which in four Hours Space or thereabouts were deprived of Life. Nay, we ourſelves (unleſs aſſiſted by the like Convenicency and the Benefit of ſome ſweet Oyls to correct the Air) cannot fetch our Breath ſo freely as at other Times, but are almoſt ſuffocated with too frequent and acid Reſpirations. They generally blow between the Eaſt and Eaſt North Eaſt, to the Northward of which they never exceed being the moſt ſettled and ſteady, but freſh Gales ever obſerved; coming without Thunder, Lightening, or Rain, but cloſe gloomy Weather, the Sun not ſhining all the Time. And when they expire the Trade Wind (which conſtantly blows on that Coaſt at Weſt South Weſt and ſouth Weſt) returns with the accuſtomary ſeaſonableneſs of Weather.

The Coaſt of *Africa* from *Cape Palmas* to *Cape Formoſa*, lie Eaſt and Eaſt by North, and near thoſe Points the Land Breezes blow on that Coaſt, which commonly begin about ſeven in the Evening, and continue all Night till near that Time the next Morning, during which Interval, we are troubled with ſtinking Foggs and Miſts off Shore, which by the Return of the Sea Breezes upon the oppoſite Points are all driven away, and we have the Benefit of them in a curious freſh Gale till about five in the Afternoon.

And here let me note it for a general Obſervation, that in theſe and all other Places within the Tropics (as far as ever I took Notice) the Wind is drawn by the Land, for if an Iſland or Head-land were inclining to a circular Form, the Sea and Land Breezes fall in diametrically oppoſite to that Part where you are. So that if you are on the South Side the Sea Breeze ſhall be at South, and the Land Breeze (when it comes in its Seaſon) at North.

In getting on the Coaſt, we endeavour to fall in with *Cape Mount* or *Cape Miſerada*, which is about eighteen Leagues to the Eaſt South Eaſtward thereof, and after that we double *Cape Palmas* (whence as aforeſaid the Land Trends away Eaſt by North,) the Current near the Shore ſets upon that Point down into the Bite. But in getting off we attempt as much as poſſible to lay hold of St. *Thomas*, and thence to run to the Southward of the Line perhaps three or four Degrees, for the further to the ſouth we go, the Stronger we find the Gales, and more beneficial for getting off the *African* Coaſt, but thoſe who keep to the Northward thereof generally meet with more Calms, and conſequently longer Voyages enſue. In or about thoſe Latitudes we continue, till we are got between twenty five and thirty Degrees to the Weſtward of *Cape Lopez de Gonſalvo*, and then we croſs again to go either for *England* or the *Weſt Indies*. But by the Way let me obſerve to you, that when once we are to the Weſtward of the *Cape*, and in South Latitude, the Current ſetts Notherly, and the Wind to twenty Degrees of Latitude is at Eaſt South Eaſt, as (to the like Number of Degrees) on the North Side of the Line it blows at Eaſt North Eaſt, neither did I ever obſerve any Mutation of the Currents unleſs in the *Tornado*-Seaſon, when during their blowing they commonly ſet to Windward, though perhaps the Moon upon full and change, may have the like Influence there as in other Places, but I never took any particular Notice thereof.

The ſaid *Tornadoes* uſually come in the beginning of *April*, and ſeldom relinquiſh the Gold Coaſt till *July* Commences, and with frequent Viſits make us ſenſible of their Qualities. We have ſometimes three or four in a Day, but then their Continuance is but ſhort, perhaps not above two Hours, and the Strength or Fury of it may be about a quarter or half an Hour, but accompanied with prodigious Thunder, Lightening and Rain, and the Violence of the Wind ſo extraordinary, as that it has ſometimes rolled up the Lead where with the Houſes are covered, as cloſe and compactly as it poſſibly could be done by the Art of Man. The Name implies a Variety of Winds, but the Strength of them is generally at South Eaſt, and by Ships that are bound off the Coaſt they are made uſe of to get to windward.

I ſhall conclude with that moſt worthy Obſervation of the Seaſon wherein the Rains begin, which on the Gold Coaſt is about the 10th of *April*, and this may be generally remarked from thirteen Degrees North to fifteen South Latitude, that they follow the Sun within five or ſix Degrees, and ſo proceed with him till he has touched the Tropic, and returns to the like Station again. This I ſhall illuſtrate by the following Example, *viz. Cape Corſo* Caſtle lies in 4° 55′ North. About the tenth of *April* the Sun has near 12° North Declination. At that Time the Rains begin and continue with the Inhabitants of that Place, untill he has performed his Courſe to the greateſt Obliquity from off the Equator, and returned to the like Poſition South. The ſame I ſuppoſe may be obſerved and underſtood of other Places within the Tropics.

The Variation (of which in the Year 1680 I made frequent Obſervations) was 2° 14′ Weſterly and it generally flows at the aforeſaid Place, South, South Eaſt, and North, North Weſt, upon the Full and Change, the Water riſing upon ſpring Tides about ſix or ſeven Feet up and down.

I remain Sir,

Your humble Servant,

J. G.

Theſe cold Winds called *Harmatans*, are not at all more extrordinary than the burning Winds on the Coaſt of *Perſia*, which are terrible to the laſt Degree, and in the Months of *June*, *July* and *Auguſt*, render *Gambroon* the only Port which the *Perſians* have on that ſide uninhabitable. Theſe Winds blow in a very narrow Compaſs, and are viſible, and therefore avoidable, which is done by throwing ones ſelf flat on the ground till they are paſt over. If a man is on horſeback when he meets them, he muſt diſmount, and turn his Horſes Tail to the Wind, and then lying down by him he preſerves the Beaſts Life and his own.

There was in the Year 1712, a very ſingular Inſtance of the Malignity of theſe Winds. Two *French* Gentlemen would needs travel in the Month of *July*, from *Gambroon* to *Iſphahan*, notwithſtanding all that the chief of the *Engliſh* Factory cou'd ſay to diſſuade them, believing probably that what he told them, was only the Fables of the Country, for which they paid dearly. The general Rule for Travellers is to ſet out between three or four in the Morning, and travel till nine, which Rule thoſe *French* Gentlemen obſerved, and being fatigued by their mornings Journey, as ſoon as they came to a *Caravanſary* (which are Lodgings built at every Stages End, a Stage being about fifteen Miles) they were diſpoſed to reſt, and ordered their Servants to make their Beds ready, (for even thoſe neceſſary Furniture, Travellers are obliged to carry along with them on carriage Beaſts) directing them to call them when dinner was ready, and withal ordered a Sheet for each of them to be dipped in Water, to lay over them to cool them: One of theſe hot Blaſts unfortunately came whilſt the Gentlemen ſlept, and had left the Windows of the Room open, and the Wind blowing in at the Windows ſcorched them both to Death on their Beds, where the ſervants found them when Dinner was ready, and pulling of the Sheets the Skin and ſome Fleſh came of with them.

It is certainly a great Happineſs to our Country that we have none of thoſe dreadful Winds. But this however need not reſtrain us from endeavouring to diſcover their Cauſes, and the Manner of their extraordinary Operations, which might perhaps be of uſe in accounting for Damps in Mines and other Places, which induced me to give them a Place here, as Matters that could not be unacceptable to the curious.

FINIS.